

[Home](#) > [Health Care Management Science](#) > [Article](#)

Selecting a decision model for economic evaluation: a case study and review

| Published: October 1998

| Volume 1, pages 133–140 (1998) [Cite this article](#)[Save article](#)[View saved research](#) >[Health Care Management Science](#)[Aims and scope](#) →[Submit manuscript](#) →[Jonathan Karnon¹](#) & [Jackie Brown¹](#)[2014](#) [Accesses](#) [67](#) [Citations](#) [Explore all metrics](#) →



Abstract

The increased use of modelling techniques as a methodological tool in the economic evaluation of health care technologies has, in the main, been limited to two approaches – decision trees and Markov chain models. The former are suited to modelling simple scenarios that occur over a short time period, whilst Markov chain models allow longer time periods to be modelled, in continuous time, where the timing of an event is uncertain. In the context of economic evaluation, a less well developed technique is discrete event simulation, which may allow even greater flexibility.

Taking the economic evaluation of adjuvant therapies for breast cancer as an illustrative example, the process of building a decision tree, a Markov chain

model, and a discrete event simulation model are described. The potential benefits and problems of each approach are discussed.

The suitability of the modelling techniques to economic evaluations of health care programmes in general is then discussed. This section aims to illustrate the areas in which the alternative modelling methods may be most appropriately employed.

 This is a preview of subscription content, [log in via an institution](#)  to check access.

Access this article

[Log in via an institution](#) →

Subscribe and save

Springer+

from €37.37 /Month

- Starting from 10 chapters or articles per month
- Access and download chapters and articles from more than 300k books and 2,500 journals
- Cancel anytime

[View plans](#) →

Buy Now

[Buy article PDF 39,95 €](#)

Price includes VAT (Poland)

Instant access to the full article PDF.

[Institutional subscriptions](#) →

Similar content being viewed by others



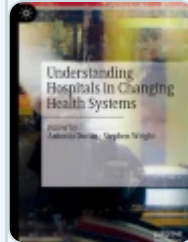
Economic Evaluation in Health Services Research

Chapter | © 2023



Modeling of Repeated Measures for Time-to-event Prediction

Chapter | © 2023



Decision Analysis

Chapter | © 2020

Explore related subjects

Discover the latest articles, books and news in related subjects, suggested using machine learning.

[Applied Probability](#)

[Health Economics](#)

[Operations Research and Decision Theory](#)

[Pharmacoeconomics](#)

[Stochastic Modelling](#)

[Stochastic Analysis](#)

References

- [1] M.J. Buxton, Health economics in the 1990's, in: *Health Economics of Depression* (1st ed.), eds. B. Jonsson and J. Rosenbaum (Wiley, 1993) pp. 1-13.
- [2] K. Blumenschein and M. Johannesson, Economic evaluation in healthcare, *Pharmacoeconomics* 10(2) (1996) 114-122.
- [3] M.J. Buxton et al., Modelling in economic evaluation: an unavoidable fact of life, *Health Economics* 6(3) (1997) 217-227.
- [4] B. Bloom, M. Buxton, M. Drummond, B. Luce and T. Sheldon, The pros and cons of modelling in economic evaluation, *OHE Briefing* 33 (1997) 1-12.
- [5] J. Fletcher, N.R. Hicks, J.D.S. Kay and P.A. Boyd, Using decision analysis to

compare policies for antenatal screening for Down's syndrome, *British Medical Journal* 311 (1995) 351-357.

- [6] T.A. Lieu, S.E. Watson and A.E. Washington, The cost-effectiveness of prenatal carrier screening for cystic fibrosis, *Obstetrics and Gynaecology* 84(6) (1994) 903-912.
- [7] D.A. Revicki et al., Modelling the cost effectiveness of antidepressant treatment in primary care, *Pharmacoeconomics* 8(6) (1995) 524- 540.
- [8] A.H. Briggs, M.J. Sculpher, R.P. Logan, J. Aldous, M.E. Ramsay and J.H. Baron, Cost effectiveness of screening for and eradication of *Helicobacter pylori* in management of dyspeptic patients under 45 years of age, *British Medical Journal* 312(7042) (1996) 1321-1325.
- [9] A. Davies and K. Cuninghame, *Breast Cancer: Screening and Treatment*, House of Commons Library Research Division, Background Paper, 1992.
- [10] K.R. Fox, Adjuvant therapies for node-positive operable breast cancer, in: *Breast Cancer Treatment - a Comprehensive Guide to Management* (1st ed.), eds. B. Fowble, R.L. Goodman, J.H. Glick and E.F. Rosato (Mosby Year Book, 1991) pp. 265-289.
- [11] J.H. Glick, Adjuvant therapy for node-negative breast cancer, in: *Breast Cancer Treatment - a Comprehensive Guide to Management* (1st ed.), eds. B. Fowble, R.L. Goodman, J.H. Glick and E.F. Rosato (Mosby Year Book, 1991) pp. 243-264.
- [12] M. Drummond, B. O'Brien, G. Stoddart and G. Torrance, *Methods for the Economic Evaluation of Health Care Programmes* (2nd ed.) (Oxford University Press, Oxford, 1997).

- [13] G.W. Torrance, Measurement of health state utilities for economic appraisal, *Journal of Health Economics* 5 (1986) 1-30.
- [14] National Cancer Institute, Questions and answers about adjuvant therapy for breast cancer, *Cancer Facts*, 1996. gopher://gopher.ncc.go.jp:70-0/CNET/All_files/600720.
- [15] R.D. Gelber, A. Goldhirsch and F. Cavalli, Quality of life adjusted evaluation of adjuvant therapies for operable breast cancer, *Annals of Internal Medicine* 114 (1991) 620-628.
- [16] J.R. Beck and S.G. Pauker, The Markov process in medical prognosis, *Medical Decision Making* 3 (1983) 419-458.
- [17] F.A. Sonnenberg and J.R. Beck, Markov models in medical decision making, *Medical Decision Making* 13(4) (1993) 322-338.
- [18] B.E. Hillner, Financial costs, benefits, and patient risk preferences in node-negative breast cancer: Insights from a decision analysis model, *Recent Results in Cancer Research* 127 (1993) 277-284.
- [19] B.E. Hillner and T.J. Smith, Efficacy and cost effectiveness of adjuvant chemotherapy in women with node-negative breast cancer - a decision-analysis model, *New England Journal of Medicine* 324(3) (1991) 160-168.
- [20] B.E. Hillner, T.J. Smith and C.E. Desch, Assessing the cost-effectiveness of adjuvant therapies in early breast cancer using a decision analysis model, *Breast Cancer Research and Treatment* 24 (1993) 97-105.
- [21] T.J. Smith and B.E. Hillner, The efficacy and cost-effectiveness of adjuvant

therapy of early breast cancer in premenopausal women, *J. Clin. Oncol.* 11 (1993) 771-776.

- [22] H. Davies and R. Davies, A simulation model for planning services for renal patients in Europe, *Journal of the Operation Research Society* 38(8) (1987) 693-700.
- [23] M.J. Buxton and B.J. O'Brien, Economic evaluation of Ondansetron: preliminary analysis using clinical data prior to price setting, *British Journal of Cancer* 66(19) (1992) 64-67.
- [24] [24] R.B. Jansen, A. Burrell, M.J.C. Nuijten and M. Hardens, An economic evaluation of Meloxicam 7.5 mg versus Diclofenac 100 mg retard in the treatment of osteoarthritis in the UK: a decision analysis model based on gastrointestinal complications, *British Journal of Medical Economics* 10 (1996) 247-262.
- [25] A.S. Midgette, J.B. Wong, J.R. Beshansky, A. Porath, C. Fleming and S.G. Pauker, Cost-effectiveness of streptokinase for acute myocardial infarction: A combined meta-analysis and decision analysis of the effects of infarct location and of likelihood of infarction, *Medical Decision Making* 14(2) (1994) 108-167.
- [26] M.H. Eckman et al., Foot infections in diabetic patients, *Journal American Medical Association* 273(9) (1995) 712-720.
- [27] M.D. Danese, N.R. Powe, C.T. Sawin and P.W. Ladenson, Screening for mild thyroid failure at the periodic health examination, *Journal American Medical Association* 276(4) (1996) 285-292.
- [28] M. Johannesson, J. Hedbrant and B. Jonsson, A computer simulation model

for cost-effectiveness analysis of cardiovascular disease prevention, *Medical Informatics* 16(4) (1991) 355-362.

- [29] R.W. Klein, R.S. Dittus, S.D. Roberts and J.R. Wilson, Simulation modelling and health care decision making (annotated bibliography), *Medical Decision Making* 13(4) (1993) 347-354.
- [30] B. Jonsson, C. Christiansen, O. Johnell and J. Hedbrandt, Cost-effectiveness of fracture prevention in established osteoporosis, *Osteoporosis International* 5(136-142) (1995) 136-142.
- [31] B. Jonsson, J. Hedbrant and O. Juhnell, A computer simulation model to analyse the cost-effectiveness of fracture prevention of osteoporosis, The Economic Research Institute, Stockholm School of Economics, 1993.
- [32] R. Davies and H.T.O. Davies, Modelling patient flows and resource provision in health systems, *Omega, Int. J. Mgmt. Sci.* 22(2) (1994) 123-131.
- [33] B. Lehaney and R.J. Paul, Using soft systems methodology to develop a simulation of out-patient services, *J. Roy. Soc. Health* (1994) 248-251.
- [34] W.M. Hart, C. Espinosa and J. Rovira, A simulation model of the cost of the incidence of IDDM in Spain, *Diabetologia* 40 (1997) 311-318.
- [35] K.E. Warner, R.J. Smith, D.G. Smith and B.E. Fries, Health and economic implications of a work-site smoking-cessation program: a simulation analysis, *Journal of Occupational and Environmental Medicine* 38(10) (1996) 981-992.
- [36] N. Urban, C. Drescher, R. Etzioni and C. Colby, Use of stochastic simulation model to identify an efficient protocol for ovarian cancer screening,

- [37] J.D.F. Habbema, J.Th.N. Lubbe, G.J. van Oortmarsen and P.J. van der Maas, A simulation approach to cost-effectiveness and cost-benefit calculations of screening for the early detection of disease, *European Journal of Operational Research* 29 (1987) 159-166.
- [38] J.D.F. Habbema, G.J. van Oortmarsen, J.T.N. Lubbe and P.J. van der Maas, The MISCAN simulation program for the evaluation of screening for disease, *Computer Methods and Programs in Biomedicine* 20 (1984) 79-93.
- [39] M.S. Roberts, Markov process-based Monte Carlo simulation: a tool for modeling complex disease and its application to the timing of liver transplantation, *Winter Simulation Conference*, 1992.
- [40] D.W. Balmer and R.P. Paul, CASM - The right environment for simulation, *Journal of the Operational Society* 37(5) (1986) 443- 452.
- [41] F.A. Sonnenberg, M.S. Roberts, J. Tsevat, J.B. Wong, M. Barry and D.L. Kent, Toward a peer review process for medical decision analysis models, *Medical Care* 32(7) (1994) 52-64.
- [42] P.G. Bolger and R. Davies, Simulation model for planning renal services in a district health authority, *BMJ* 305 (1992) 605-608.

Author information

Authors and Affiliations

**Health Economics Research Group, Brunel University, Uxbridge,
Middlesex, UB8 3PH, UK**

Rights and permissions

[Reprints and permissions](#)

About this article

Cite this article

Karnon, J., Brown, J. Selecting a decision model for economic evaluation: a case study and review. *Health Care Management Science* **1**, 133–140 (1998). <https://doi.org/10.1023/A:1019090401655>

Issue date

October 1998

DOI

<https://doi.org/10.1023/A:1019090401655>

Keywords

[Breast Cancer](#)

[Decision Tree](#)

[Adjuvant Therapy](#)

[Economic Evaluation](#)

[Discrete Event Simulation](#)

Search

Search by keyword or author



Navigation

Find a journal

Publish with us

Track your research

